

ARCHAEOASTRONOMICAL STUDY TOUR IN THE VICINITY OF HALLE

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In the environs of the city of Halle an der Saale in eastern Germany a great number of archaeological relics even from a European perspective have been found that are related to astronomy (archaeoastronomy). Of these, the most interesting and most famous is the Nebra sky disk, which most likely could have been a symbolic “calendar” for an early Bronze Age community. Furthermore the “Solar Observatory” near Goseck was a circular group of structures made up of ditches and palisades whose gateways are precisely oriented in the direction of the sunrise and sunset at the winter solstice. I travelled here with two companions at the end of March this year.

The archaeoastronomical sights in the vicinity of the city are linked together by the one-day tour route called the *Himmelswege* (Sky Path). The route leads to four main sites: it starts from the State Museum of Prehistory in Halle, where one can view the Nebra sky disk, then continues through Langeneichstädt towards Nebra, where the recently constructed visitors' center and the archaeological site are. The final stop of the tour is the Neolithic circular ditch next to Goseck.¹ As a Bronze Age archaeologist strongly interested in astronomy, I had long wanted to visit this area and view the exhibits of Saxony-Anhalt's *Landesmuseum für Vorgeschichte* as well as these archaeological sites. This wish was fulfilled between the 24th and the 28th of March of this year when I travelled to Halle together with two others who were also interested in astronomy and archaeology, Dr. János Harmatta (the son of the paleolinguist János Harmatta) and Péter Molnár, the secretary of the Hungarian Astronomical Society.

Since there is a good quality expressway that runs from Budapest almost all the way to the eastern part of Germany we decided to travel by car, and we drove the nearly 700 kilometers in one go. It was the late afternoon when we arrived at Halle, a historic little city that during the communist era had been developed into a center of heavy industry. The name of the city indicates that in past times the inhabitants were involved in the production of salt. This is also suggested by the name of the river, Saale. Amongst its oldest monuments are the cathedral that was begun at the end of the 13th century and completed in the 16th century and the 15th century Red Tower. The origins of the castle, the archbishop's palace, most of the churches and many of the town's houses stretch back to the turn of the 16th century for the most part. An unusual built monument of Halle is the so-called New Mill, which is only new in name; its late Gothic/Renaissance



Fig. 1: The route of the *Himmelswege* in the brochure from the Halle museum

¹ For information on Nebra and Goseck see the following summaries: Meller, Harald (hrsg.): *Der Geschmiedete Himmel. Die weite Welt im Herzen Europas vor 3600 Jahren* (Halle/Saale: Theiss, Konrad, 2004), and Maraszek, Regine: *The Nebra Sky-disc. Kleine Reihe zu den Himmelswegen, Band 2.* (Halle/Saale: Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt, 2009).

structure was constructed at the end of the 15th century along the banks of the man-made mill run that was diverted off of the Saale River. The inscriptions on the building indicate the heights of the major floods that occurred over the centuries, starting from about 1500. Today the building is unfortunately closed and neglected, despite being completely intact.

Our first trip took us to the Landesmuseum für Vorgeschichte, where we had already arranged a meeting with Dr. Regine Maraszek, the curator of the permanent archaeological exhibit. This energetic young archaeologist earned her PhD degree by studying the late Bronze Age Urnfield culture period. She organized the Bronze Age section of the exhibit, at the center of which stands the Nebra sky disk. She led us around the entire exhibit on prehistory, the first two rooms of which display relics of the Paleolithic Era. The most famous site for this is Bilzingsleben, whose finds are roughly contemporaneous with those of Vértesszőlős in Hungary and come from a nearly identical geological environment (travertine basins of hot springs). The Mesolithic room was quite interesting, here the grave of a woman found near Bad Dürrenberg was displayed, which contained bird wings, turtle shells, clam shells, bone needles, stone and antler axes, wild boar tusks and a deer antler headdress, in addition to the skeleton. The locations of these imply garments that had a complex symbolic meaning. It is nearly certain that the 25–35 year old woman buried here was a shaman, who according to the dating lived around 7000–6600 B.C.²

Three rooms deal with the Bronze Age, with the middle one being of the greatest interest to us; this is where the Nebra sky disk itself is displayed. On the dome-shaped ceiling there is a fairly precise reconstruction of the night sky as it appeared around 1600 B.C. Holes of various sizes drilled into a drop ceiling represent the stars, in their proper places, and even the path of the Milky Way appears in a realistic manner. The lighted surface behind the ceiling provides the light of the Milky Way and the dimmer stars, while the brighter ones are lit by their own LEDs. It is outstanding work! Thus, the disk stands by itself in a huge, round, completely black display case.



Fig. 2: The building of the Landesmuseum für Vorgeschichte was modeled after a Roman fort a good century ago, and even originally was intended as a museum (photograph: Dr. János Harmatta)

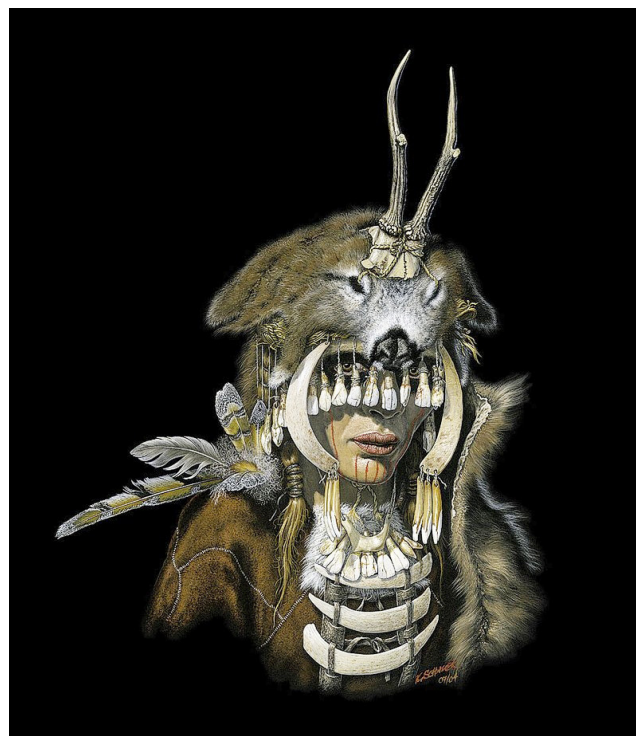


Fig. 3: The reconstructed image of the woman – the Female Shaman – lying in the Mesolithic grave found in Bad Dürrenberg. From the illustration on page 64 of Meller, Harald (hrsg.): *Menschenwechsel. Jungpaläolithikum und Mesolithikum. Begleithefte zur Dauerausstellung im Landesmuseum für Vorgeschichte Halle, Band 2.* (Halle/Saale: Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt, 2011)

² Meller, Harald (hrsg.): *Menschenwechsel. Jungpaläolithikum und Mesolithikum.* Begleithefte zur Dauerausstellung im Landesmuseum für Vorgeschichte Halle, Band 2. (Halle/Saale: Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt, 2011), 54–64.

When entering one does not see it immediately, but instead can read the words of Homer that describe the shield of Achilles:

*“He wrought the earth, the heavens, and the sea;
the moon also at her full and the untiring sun,
with all the signs that glorify the face of heaven-
the Pleiads, the Hyads, huge Orion, and the Bear,
which men also call the Wain
and which turns round ever in one place, facing Orion,
and alone never dips into the stream of Oceanus.”³*

Moving past the screen with the inscription we see in the display case the 30 cm bronze disk, which in addition to a crescent moon, a full moon and 32 stars, including the Seven Sisters (the Pleiades or the M45 star cluster), depicts horizon arcs and a solar barge. These symbols are covered in gold leaf. The Seven Sisters and the Moon appear near one another in the sky on two notable occasions during the year: the crescent moon at about the time of the spring equinox when work in the fields begins; and the full moon at the end of October when this work ends. Therefore, the dual depiction indicates these two significant events of the year. The Pleiades show up as a calendar star (not forgetting that we are talking about a star cluster) already in Hesiod:

*“But when the Pleiades and Hyades and strong Orion
begin to set, then remember to plough in season: and so the
completed year will fitly pass beneath the earth.”⁴*

The horizon arcs show the locations of the rising and setting sun at the latitude of Nebra around 1600 B.C. The eastern (left side) arc shows the location of the rising sun at the winter and summer solstices, while the western arc (on the right) provides the sunsets at these same times. The solar barge highlights the importance of the role of our life-giving star. The horizon arcs and the solar barge were added on to the disk at a later date, so at first the spiritual message was expressed by the two main phases of the Moon (crescent and full) and the Seven Sisters. The archaeoastronomical examinations of Ralph Hansen, an astronomer who studied the disk, suggest a new, interesting level of meaning for the Nebra sky disk. He believes he sees the beginnings of calendar making; following the path of the Moon may suggest the use of a lunar calendar. Since a lunar year comprised of 12 lunar months is 354 days, 11 days shorter than a solar year, the difference between a lunar calendar and the



Fig. 4: The Nebra sky disk. From the illustration on page 43 of Maraszek, Regine: *The Nebra Sky-disc. Kleine Reihe zu den Himmelswegen, Band 2.* (Halle/Saale: Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt, 2009)

³ Homer: *The Illiad*. XVIII. 483–489. Translation by Samuel Butler. <http://classics.mit.edu/Homer/iliad.html>

⁴ Hesiod: *Works and Days*. Translation by H.G. Evelyn-White. <http://omacl.org/Hesiod/works.html>



Fig. 5: Donjon at Langeneichstädt (photograph: Dr. János Harmatta)



Fig. 6: The mysterious Dolmengöttin (photograph: Dr. János Harmatta)

solar calendar will be an entire month after three years. After a few years the lunar calendar will become unsuitable for forecasting events important for agriculture. However, Hansen argues that if the calendar is corrected every third or fourth year (or if an extra month is inserted), the seasons that follow the movement of the sun (and the agricultural activities that are regulated by them) and the lunar months that are so easy to observe can again be synchronized. The first mention in writing of the rules for correction, or in other words a proper combined lunisolar calendar, come from a 7th–6th century B.C. tablet from Babylon. This correction, he asserts, was performed by determining the beginning of the first month of the lunar year (spring) by the phase of the Moon next to the Seven Sisters, as is seen on the disk. If the new moon was far from the Pleiades and a crescent moon that had only been waxing for a couple days appeared next to them, then the correction was necessary. It is precisely a waxing crescent moon that appears on the disk. The difference between a lunar year and a solar year is 33 days in 3 years, but the first light of the new moon can only be seen on the second day, so exactly 32 days pass from the last lunar month of the year until the new moon, when the Moon arrives next to the Pleiades. The number of the stars is on the disk, so this rule is repeated in a visual form as well. So, to summarize this briefly, the calendar disk, according to Hansen, contains the following instructions: if on the first day of the first month (spring) of the year (lunar year) the crescent of the new moon is not seen next to the Pleiades, but instead a couple of days later and appears next to the stellar cluster in the waxing phase seen on the disk, then an extra month must be inserted and the new year and the spring only begin with the next new moon.⁵

Perhaps at first it seems hard to believe that a Bronze Age community would have this level of knowledge. But, at the same time, it is likely that a group who is living close to nature and paying



Fig. 7: Stone chamber (dolmen) grave in the mound upon which the Dolmen Goddess stands (photograph by the author)

⁵ Maraszek, Regine: *The Nebra Sky-disc*. Kleine Reihe zu den Himmelswegen, Band 2. (Halle/Saale: Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt, 2009), 46–49; Hansen, Ralph: Sonne oder Mond? Wie der Mensch in der Bronzezeit mit Hilfe der Himmelscheibe Sonnen- und Mondkalender ausgleichen konnte. *Archäologie in Sachsen-Anhalt* 4/2, 2006 (2007), 289–304.



Fig. 8: The Arche Nebra visitors' center (photograph: Dr. János Harmatta)



Fig. 9: The exhibition hall of Arche Nebra – detail (photograph by the author)

much greater attention to the stars and the Moon would quickly recognize these rules in the movement of the heavens. If we are talking about the length of the year and the time of sowing, then a prehistoric agricultural community could not unconditionally align itself only to the weather, since there can be good weather even in February and snow even in April. It is my opinion that a calendar based upon astronomical phenomena could have provided the point of comparison to determine the time for sowing and other agricultural activities. The disk may have been a reference aid for passing down this acquired knowledge and the correction of the calendar, as well as expressing the solidarity of the community. While viewing the exhibit, Dr. Maraszek stated that the rescue excavations performed during the construction of the 2.7 km bridge spanning the Unstrut Valley between Steigra and Wetzendorf uncovered an enormous amount of early Bronze Age finds, and essentially a “city” from that time may have existed a few kilometers from the Nebra hill. The disk may have been used there or they may have carried it around on a pole as a sacred emblem. The holes on the edge of the disk are certainly evidence that it was affixed to some impermanent material.

On our second full day we decided to do the full *Himmelsweg*, so setting off in the morning we visited Langeneichstädt, where in a field near the village the *Dolmengöttin* (Dolmen Goddess) figure stands next to a 15th century donjon. An abstract, upright female figure was engraved in a carved stone column about 1 meter tall. Unfortunately it is rather worn, with only its head clearly discernible. Three horizontal lines cross the oval head, and the arms are held up in an orant (praying) pose. Unfortunately, more cannot really be seen of the figure. The carved menhir stands in its original location atop a low burial mound. There is a so-called dolmen grave, a chamber made of stone slabs, in the mound. Abundant grave goods were found in the grave, on the basis of which it was dated to 3500 B.C., the late Neolithic in this area. The *Dolmengöttin* may be the same age as the burial.

Leaving this prehistoric site with its unusual atmosphere we soon arrived at the town of Steig. Here the landscape changed suddenly; the road twisted downward with no warning from a perfectly flat plain to the broad valley of the Unstrut River at least 80–90 meters below. Before us was the huge, recently constructed bridge across the valley, and after a few minutes of travelling we were already on its opposite side, arriving at Nebra. From the nicely constructed parking lot at the edge of the village we walked up to the modern building of the *Arche Nebra* (Arc of Nebra), which is a truly imposing sight on the side of the hill. This is not the archaeological site, just the exhibition hall and visitors' center, where one can view an interactive exhibit and a planetarium. The exhibit is in a single space and the displays containing the objects and



Fig. 10: The observation tower atop Mittelberg Hill in Nebra
(photograph: Dr. János Harmatta)



Fig. 11: The site where the Nebra sky disk was found is marked by a relief mirror
(photograph: Dr. János Harmatta)

informational materials are ultramodern installations, as they are reminiscent of capricious Möbius strips, twisting back and forth. The theme of the exhibit fully elaborates the history of the find, the circumstances of its discovery and the fabrication of the object from the mining of its materials to its being hidden away. It provides detailed information about the disk's astronomical meaning, including its function as a calendar.

For me the most exciting aspect was the full scale copy of the disk, which anyone could hold and feel (naturally it was chained down). It was quite an experience holding the – surprisingly heavy – 2.2 kilo disk in my hands!

Various programs are also organized at the exhibition hall on 2 or 3 days in a month: some are thematic evening events where a recognized researcher on the given topic (archaeology, history, astronomy, etc.) gives a presentation to an audience open to a deeper understanding of the subject, while others are family days when there are interactive play areas. On the summer solstice (June 21st) a running race is held on the route of the *Himmelswege* – altogether at least 70 km long – and in the evening they view the sunset. The planetarium show presented for the most part what we learned from the exhibit, but highlighted the astronomical aspects.

There are two ways to get to the archaeological site: by bus or on foot, because cars are not allowed. The chain of hills comprises a part of the Salle-Unstrut-Triasland Nature Park and Geopark. The hills are formed of easily-shaped, so-called variegated sandstone of the Triassic period, which was deposited by a very shallow sea located here at the beginning of the Mesozoic era. Since the buses were not running at this time of year we “chose” to walk in the pleasant, sunny, 15°C spring weather. After a good half-hour walk along a beautiful hiking trail in the valley we reached the 260 meter peak. The peak is treeless, with a huge leaning tower that is split in two standing in the middle, the open portion of which is precisely oriented towards the point where the sun sets on the summer solstice. The top of the hill is surrounded by a square earthen rampart that was constructed in the early Iron Age. The site where the disk was found is marked by a futuristic relief mirror of a good meter, and the shallow depression where this is found is surrounded by a low fence.

After hiking down the hill we started off for Goseck by car. Those who have already read a bit about the Nebra sky disk may have heard about the Neolithic system of circular ditches and palisades, which, due to its unusually precise astronomical orientation, stands out amongst the circular enclosures of this age, that is 6,800–6,600 years old (from 4800–4600 B.C.), that are common throughout Central Europe, including Hungary. The visitors' center here is much more modest than of Nebra, it is found in the Goseck Castle and is comprised

of four relatively small rooms. There is little other than pictures and text here, but there is a very nice model reconstruction of the Solar Observatory. The so-called Solar Observatory of Goseck has three entrances and was constructed of double palisades surrounded by ditches, but no remains of contemporary settlement have been found in the inner courtyard. One of its three entrances faced the north, the second the point where the sun rises on the winter solstice and the third the direction of the sunset on the winter solstice. Small openings were formed in some places along the palisade, through which those in the center could observe the rising and setting of the sun on the summer solstice as well.



Fig. 12: The model of the Solar Observatory of Goseck at the visitors' center (photograph: Dr. János Harmatta)

The site lies on the edge of the village, and the Neolithic Solar Observatory has been reconstructed in its entirety on the site of the original excavation. The row of posts is 70 meters in diameter, at the center of which is a metal plaque that shows the structure's astronomical orientation. We took a few pictures and then headed back to our accommodations having travelled the length of the Sky Path. Early the next morning we set off for home, but en route we found a couple of hours for the picturesque gothic town of Freiberg in the Ore Mountains (*Erzgebirge*) a few hours from the Polish border. After a brief bit of sightseeing and visiting museums we bid adieu to this city that was once famous for its silver mines, and then set off on the road home.

RECOMMENDED LITERATURE

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THE HOME PAGE OF THE HALLE MUSEUM

http://www.lda-lsa.de/landesmuseum_fuer_vorgeschichte